DETAILED ACTION

Summary

1. This Office Action is based on the Reply to Office Action filed with the Office on July 7, 2009, regarding the MURATA application.

2. Claims 1-10 and 16 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-4, 8-10 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over AMADA et al. (Japanese Patent Application Publication JP

H11-122950, A), as evidenced by an Internet webpage regarding Modulus of Rigidity from The Engineering Tool Box (http://www.engineeringtoolbox.com/modulus-rigidity-d_946.html, access on March 6, 2009; herein after referred to as "WEBPAGE") and as evidence by the entry for the term "rigidity" from the online version of Webster's Third New International Dictionary, Unabridged.

Regarding claim 1, AMADA discloses an exhaust heat electrical generating apparatus comprising:

a thermoelectric converting unit that converts thermal energy of exhaust gas into electrical energy (element 33 in Drawing 2);

a heat exchange unit (elements 21 and 19 in Drawing 2) on one surface of the thermoelectric converting unit to conduct thermal energy from the exhaust gas that follow through an exhaust pipe (paragraph [0015]); and

a cooling unit on the other surface of the thermoelectric converting unit (element 13a in Drawing 2).

AMADA also teaches that the heat exchange unit (elements 21 and 19 in Drawing 2) can be fabricated from stainless steel, cooper, aluminum, aluminum alloys, iron, carbon steel, Monel, among other materials. It would be understood by one of skill in the art that the thermoelectric converting unit disclosed by AMADA is semiconductor device, fabricated from silica or like materials. AMADA does not specifically state the fabrication material of the cooling unit. However, AMADA teaches that the cooling unit may comprise, in addition to an air cooled

design, a water cooled jacket structure or a refrigerant cooled system (paragraph [0052]). It would be obvious to one of ordinary skill in the art that a water cooled jacket structure or refrigerant cooled system should be fabricated from a material which would prevent the corrosion of the cooling unit and failure of the entire system. AMADA teaches such a corrosion preventing material is stainless steel (paragraph [0050]). Therefore, one of ordinary skill, based on the teachings of AMADA could fabricate an exhaust heat electrical generating apparatus embodiment, among other embodiments, with a silica-based thermoelectric converting unit, having a modulus of rigidity (MOR) value of about 19 GPa (WEBPAGE); a heat exchange unit fabricated from either aluminum alloys (MOR = 27 GPa; WEBPAGE), copper (MOR = 45 GPa; WEBPAGE), iron (MOR as high as 66 GPa; WEBPAGE), carbon steel (MOR = 77 GPa; WEBPAGE), or Monel (MOR = 66 GPa; WEBPAGE); and a stainless steel cooling unit (MOR = 77.2 GPa; WEBPAGE). This obvious embodiment would have a cooling unit with the highest rigidity among itself, the heat exchange unit, and the thermoelectric converting unit.

Rigidity has as one of the possible definitions "rigidity modulus" (fourth meaning, p. 2 of entry for the term “rigidity” from the online version of Webster's Third New International Dictionary, Unabridged).

Regarding claim 2, AMADA teaches a heat exchange unit that includes a heat exchange fin for collecting the thermal energy of the exhaust gas (element

21 in Drawing 2) and a base (element 19 in Drawing 2) having one surface (element 19a in Drawing 2) attached to the heat collected fins (i.e., the heat exchange unit) and the other surface is in contact with the thermoelectric converting unit. AMADA also teaches the exhaust pipe includes a main body that forms a frame of an exhaust passage, which is the inner shell (element 19 in Drawings 2 and 3), which is the base of the heat exchange unit, and the heat exchange fins are disposed therein (element 21 in Drawings 2 and 3); therefore, exhaust passage is constructed by the exhaust pipe and the heat exchange unit as they are one and the same (element 19 & 21 in Drawings 2 and 3). AMADA also teaches that heat exchange fins and base component are manufactured in the described embodiment from stainless steel (paragraph [0063]), but one of ordinary skill in the art would recognize that the heat exchange unit components can be fabricated from a number of different metals, including those that were less rigid than stainless steel (paragraph [0063]). Therefore, one skilled in the art could produce a base which is constructed from a more rigid material than that of the exhaust passage.

Regarding claim 3, AMADA teaches the main body of the exhaust pipe, i.e., the inner shell (element 19 in Drawings 2 and 3) can be formed from a number of metals to address thermal conductivity (paragraph [0063]), and therefore could be chosen to be constructed of a material with a thermal

expansion ratio lower than the other component of the heat exchange unit, namely the heat collection fins (element 21 in Drawings 2 and 3).

Regarding claim 4, AMADA teaches the main body of the exhaust pipe manufactured in one of the described embodiment is fabricated from stainless steel (paragraph [0063]).

Regarding claim 8, AMADA teaches a configuration of the exhaust heat electrical generating apparatus where the heat exchange fins are configured in a plurality where some of the fins are disposed 180 degrees from each other (elements 21, 21a, and 21b in Drawings 3-7), i.e., they are disposed at a different pitch.

Regarding claim 9, AMADA teaches that the heat exchanging fins (elements 21, 21a, and 21b in Drawings 3-7) can consists of two kinds of stainless steel plates (paragraph [0053]) that would inherently exhibit different heat conductivities.

Regarding claim 10, AMADA teaches the main body of the exhaust pipe, i.e., the inner shell (element 19 in Drawings 2 and 3) and the heat exchange fins (element 21 in Drawings 2 and 3) can be formed from a number of metals and/or ceramic, so to address endurance, thermal conductivity, and heat deformation (paragraph [0063]). Therefore, it would be obvious to one of ordinary skill to

choose construction material to give a configuration where the heat exchange unit (i.e., heat collection fin) deformation would be in an opposite direction from an exhaust pipe deformation to keep proper spacing for heat exchange.

Regarding claim 16, AMADA teaches the cooling unit is in thermal contact with the thermoelectric converting unit (paragraph [0051]).

6. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over AMADA et al. (Japanese Patent Application Publication JP H11-122950, A), as evidenced by an Internet webpage regarding Modulus of Rigidity from The Engineering Tool Box (http://www.engineeringtoolbox.com/modulus-rigidity-d_946.html, access on March 6, 2009; herein after referred to as “WEBPAGE”) and as evidence by the entry for the term “rigidity” from the online version of Webster's Third New International Dictionary, Unabridged as applied to claims 1-4, 8-10, and 16 above, and further in view of SHINOHARA et al. (JP H11-036981, A).

Regarding claims 5-7, AMADA teaches the limitations of Claim 2, as outlined above.

AMADA also teaches the exhaust pipe in the center of the apparatus (Drawing 2), the thermoelectric converting unit on the outer periphery of the heat exchange unit attached to the main body of the exhaust pipe (Drawing 2), and

the cooling unit on the outer periphery of the thermoelectric converting unit (Drawing 2). AMADA teaches the thermoelectric unit is formed by a plurality of thermoelectric units (element 33 and all like unlabeled elements, Drawing 2).

AMADA does not teach an elastic member on the outer side of the cooling unit, an elastic system, a unit of elastic system structured based on the thermoelectric module, nor that the elastic member includes a spring and a compression member which are one of in point contact and line contact with each other.

However, KAZUHIKO discloses an exhaust heat power generating device, wherein is taught elastic members on the outer side of the cooling unit (elements 100 and 110 in Drawing 7) and these members are part of a system for fixing the thermoelectric converting unit by applied pressure to the cooling unit externally by the elastic member (paragraph [0051]). KAZUHIKO also teaches the elastic system is structured based on the module of the thermoelectric converting units as evidenced in Drawings 6 and 7, where elements 10b, 11b, 100b, and 110b represent “breakthroughs” corresponding to the plurality of thermoelectric elements. KAZUHIKO et al. also teaches the elastic member includes a spring material and compression member in contact (paragraphs [0051] - [0053]).

AMADA and KAZUHIKO are analogous art, in that they deal with the same technology area, thermoelectric exhaust gas power generators.

At the time of the present invention, it would have been obvious to one of ordinary skill in the art to modify the exhaust heat electrical generating apparatus

of AMADA with the elastic system elements of KAZUHIKO because to do so allows any thermal expansion to be eased (KAZUHIKO et al., paragraph [0051]).

Response to Arguments

7. Applicant's arguments filed July 7, 2009, have been fully considered but they are not persuasive. The Applicant has stated in filed Remarks (p. 3) the modulus of rigidity does not equate to rigidity as it is used by the Examiner in rejection of claim 1, and has filed a Declaration under 37 CFR 1.132 to support this traverse. However, the term “rigidity” can be defined as “rigidity modulus” as shown in the online definition of the term from Webster's Third New International Dictionary, Unabridged. Using this definition of "rigidity" when interpreting the claim would be consistent with the broadest reasonable interpretation of the term and it has been expressly recognized in the Federal Circuit’s *en banc* decision in *Phillips v. AWH Corp.*, 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005) that the USPTO employs the “broadest reasonable interpretation” standard for claim interpretation:

> The Patent and Trademark Office (“PTO”) determines the scope of claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction “in light of the specification as it would be interpreted by one of ordinary skill in the art.” *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364[, 70 USPQ2d 1827] (Fed. Cir. 2004). Indeed, the rules of the PTO require that application claims must “conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear

> support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description." 37 CFR 1.75(d)(1).

The instant specification, as originally filed, sets forth no formal definition for interpretation of the term "rigidity". While it is well-recognized that the applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning by clearly setting forth a definition of the term that is different from its ordinary and customary meaning, any special meaning assigned to a term "must be sufficiently clear *in the specification* (emphasis added) that any departure from common usage would be so understood by a person of experience in the field of the invention." (*Multiform Desiccants Inc. v. Medzam Ltd.*, 133 F.3d 1473, 1477, 45 USPQ2d 1429, 1432 (Fed. Cir. 1998)).

Further, there is nothing set forth in the instant specification as to how to arrive at the value of rigidity. The closest teaching to ascertain rigidity is the recitation of the composition of particular elements, such as that the heat exchange unit and cooling unit are formed from aluminum (paragraphs [0013], [0056], [0061], and [0091] of the US patent application publication of the instant application, US 2006/0101822 A1), and the particular shape of said elements, such as the heat exchange unit is an ambiguously thick plate-like shape (paragraph [0061]-[0062]) and the cooling unit has box-like shape with a large, undefined thickness (paragraph [0058]-[0059]). However, these limitations still

do not lead conclusively to an obvious determination of a “value of rigidity” as required by the claims.

Furthermore, the definition proposed in the Mr. Murata's declaration executed on June 23, 2009 (paragraph 4), does not seem to be applicable to the instant invention. In defining the term “rigidity”, Mr. Murata states it "is the relative stiffness of components *sharing a load*" (emphasis added). However, the thermoelectric converting unit, heat exchange unit, and cooling unit, which are to each have a value of rigidity, as recited in the claims, do not share a load. This conclusion comes from the relative position of these elements to each other as laid out in claim 1.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. SAKURAGI (US 6,002,081) discloses a thermoelectric component, wherein is taught a thermoelectric converting unit, a heat exchange unit, and a cooling unit. The heat exchange and cooling units are fabricated from aluminum, and formed in plate or box-like shape.

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. CHRISTOPHER BALL whose telephone number is (571)270-5119. The examiner can normally be reached on Monday through Thursday, 9 am to 5 pm Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

JCB
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